J2EE Design Notes

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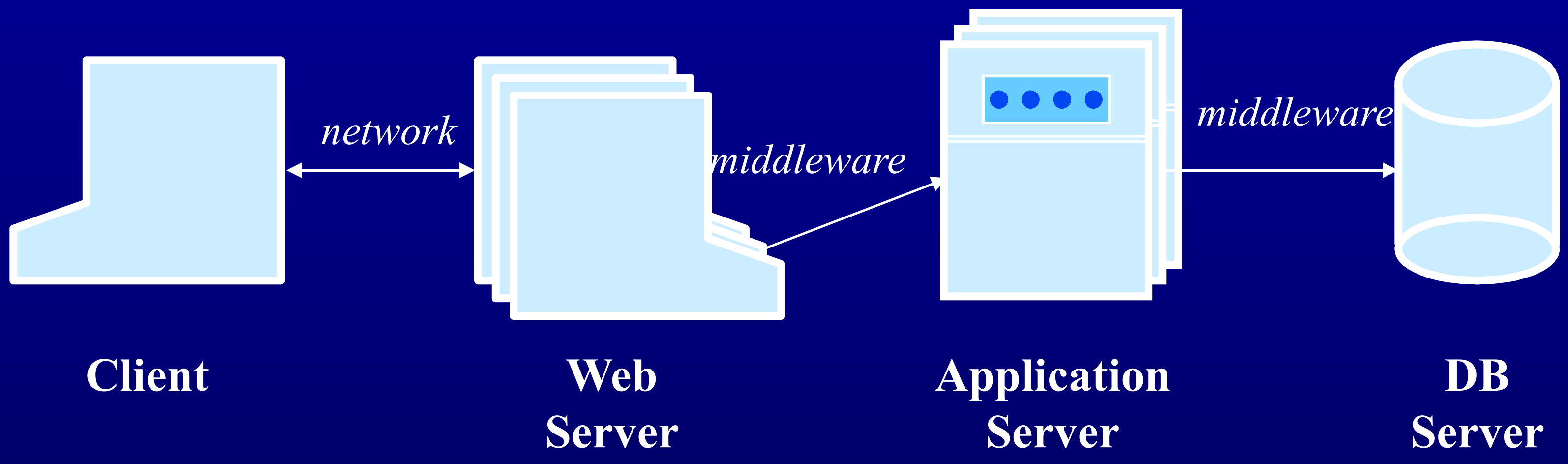
SWE 432

Design and Implementation of Software for the Web

N-Tier Architecture



Client-server … 3-tier … N-tier …

Design Goals

- A major design goal of the N-tier architecture is separation of concerns :
  - Presentation
  - Logic
  - Data
- Also to support our seven criteria :
  - Maintainability
  - Security
  - Scalability
  - …

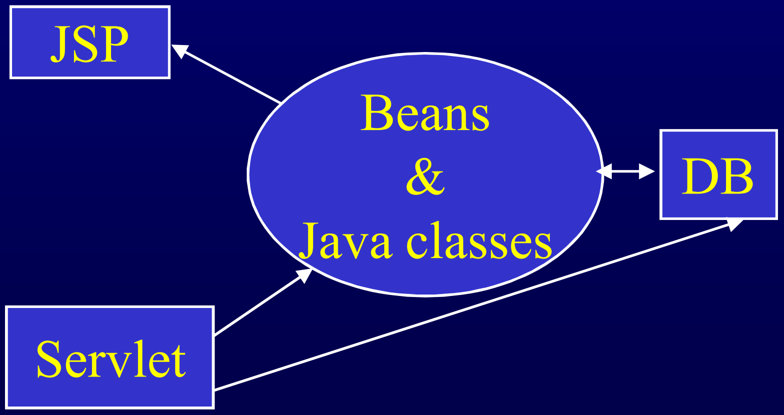
Separation of Concerns

• Presentation	HTML & JSP
• Data content	Servlets & beans
• Data representation	Data structures Beans & Java classes
• Data storage	Data base & files Oracle, SQL

Separation of Concerns (2)

- *doGet*() and *doPost*() should be simple and short
  - Shift processing to other methods and classes
- Put complicated logic in non-servlet classes
- Put almost no logic in JSPs
  - JSPs should present data they get from other classes

- Use JSPs to present data that is on server
- Use servlets to process user input



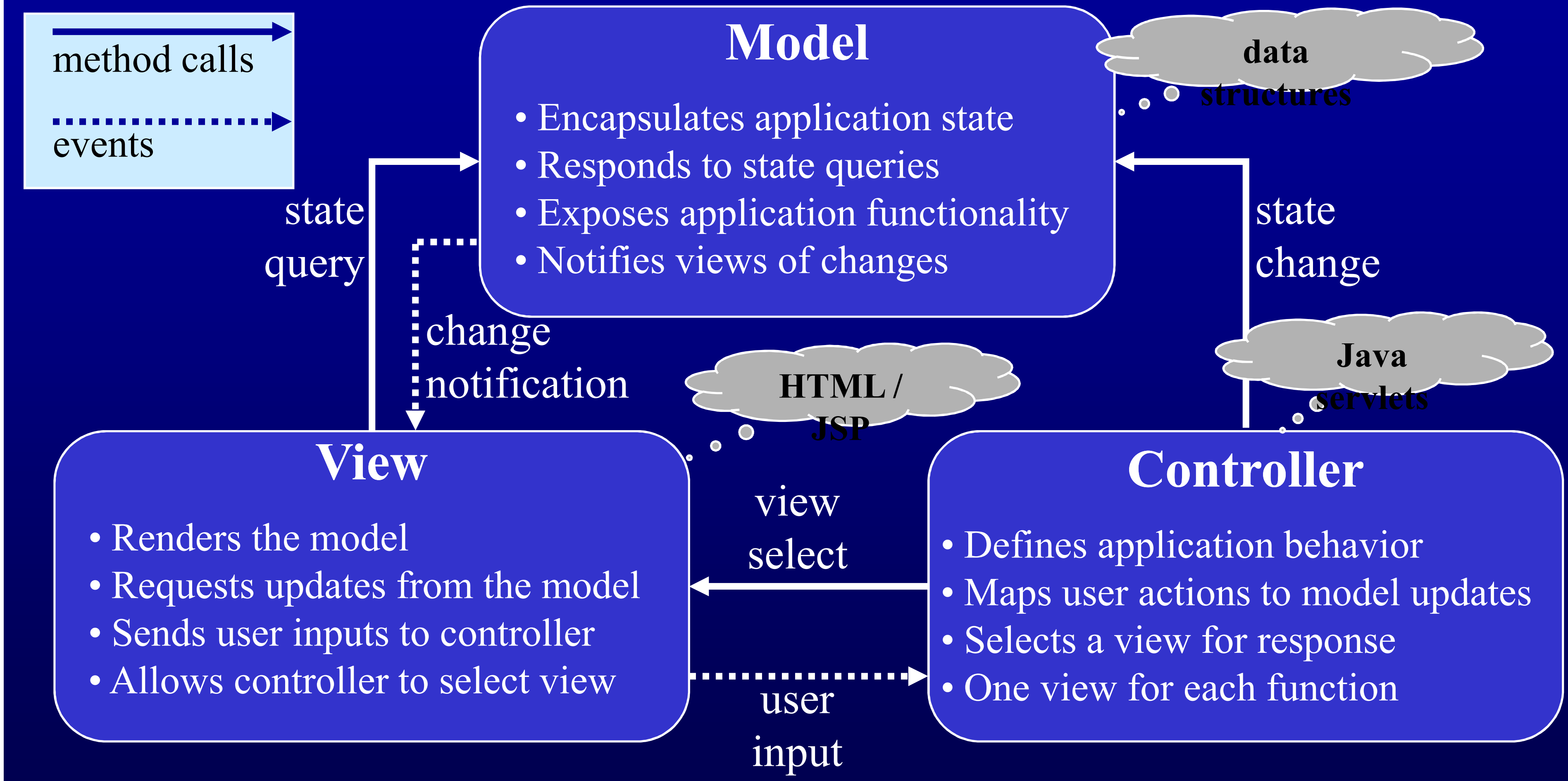
Design Specification

- Software Requirements Baseline
- Information Architecture Specification
  - Site map, Web Page Flows, Compositions, Labeling, Data Element Mappings
- Web Application Design
  - High-Level Software Design
  - Software Architecture and System Architecture Diagram
  - Class Diagrams
  - Sequence Diagrams
  - Class Specifications

Model-View-Controller (MVC)

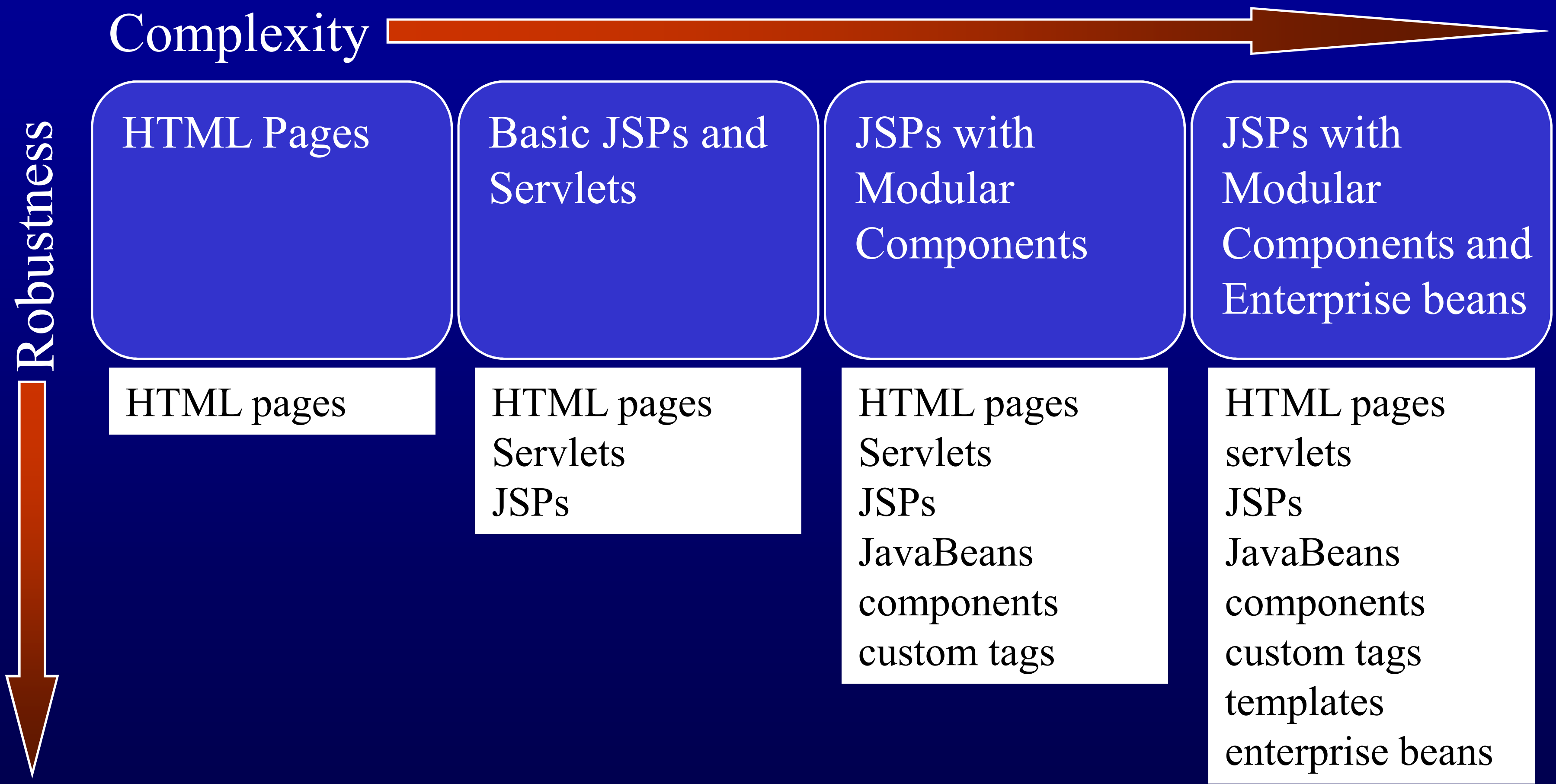
- The MVC architecture is an abstraction frequently used in web application design
  - Provides a way to divide the responsibilities of objects
  - Decreases coupling between objects and layers (supports easier maintenance)
  - Helps divide the work – supports development expertise areas

Model-View-Controller (MVC)


method calls
events
Model
• Encapsulates application state
• Responds to state queries
• Exposes application functionality
• Notifies views of changes
data structures
state query
change notification
state change
HTML / JSP
Java servlets
View
• Renders the model
• Requests updates from the model
• Sends user inputs to controller
• Allows controller to select view
view select
user input
Controller
• Defines application behavior
• Maps user actions to model updates
• Selects a view for response
• One view for each function

* Graphic from Designing Enterprise Applications with the Java 2 Platform, Enterprise Edition, Nicholas Kassem et al., October 2000

Web Application Design Complexity



Graphic from Designing Enterprise Applications with the Java 2 Platform, Enterprise Edition, Nicholas Kassem et al., October 2000

Common Design Pitfalls

- No design specifications and no comments in code
- Overly limiting collaboration amongst the development team - only 1-2 people understanding and owning the design
- Coding for future requirements
  - Don't code ahead
- Using only parts of a documented design framework that are too elaborate

Best Practices

- Establish a Software Requirements Baseline
- Create design specifications (before coding!)
- Use Java Doc
- Teach entire development team the design patterns and design constructs selected for the application, especially the connection points between tiers
  - Every member should be able to explain the design
- Use meaningful names for packages, classes, methods, and variables
  - Ask your teammates if they can understand your names
- Use object-oriented principles to design and develop adaptable systems
  - SWE 619